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EXAMINER	
CHANDRA, SATISH	
ART UNIT	**PAPER NUMBER**
1792	

NOTIFICATION DATE	DELIVERY MODE
10/06/2008	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No.	Applicant(s)	
	10/521,444	FINK, STEVEN T.	
	Examiner	Art Unit	
	SATISH CHANDRA	1792	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *24 June 2008*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *56-70* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *56-70* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *14 January 2005* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *1/05*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

In view of the Appeal Brief filed on 6/24/2008, PROSECUTION IS HEREBY REOPENED. New grounds of rejection are set forth below.

To avoid abandonment of the application, appellant must exercise one of the following two options:

(1) file a reply under 37 CFR 1.111 (if this Office action is non-final) or a reply under 37 CFR 1.113 (if this Office action is final); or,

(2) initiate a new appeal by filing a notice of appeal under 37 CFR 41.31 followed by an appeal brief under 37 CFR 41.37. The previously paid notice of appeal fee and appeal brief fee can be applied to the new appeal. If, however, the appeal fees set forth in 37 CFR 41.20 have been increased since they were previously paid, then appellant must pay the difference between the increased fees and the amount previously paid.

A Supervisory Patent Examiner (SPE) has approved of reopening prosecution by signing below:

/Parviz Hassanzadeh/

Supervisory Patent Examiner, Art Unit 1792

Drawings

The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the valve and vacuum pump of the pumping cells must be labeled and seal must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 56, 64 and 66 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to

reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

Claim 56 recites the language “a pumping cell, integrally including a vacuum pump and a valve”.

Applicant’s specification does not disclose a pumping cell comprising an integral body of a vacuum pump and a valve.

For the purpose of Examination, the Examiner will interpret a pumping cell is a single pump body and a valve. The Examiner recommends removing the word “integral” from the claims.

Claim 56 also recites the language 'seal'. Applicant's specification discloses a lid forming a seal (Para 0027). For the purpose of Examination, the Examiner is interpreting it as a valve, plate, lid, or other means of sealing. The Examiner recommends changing "seal” to “lid”.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 56, 62, 69 and 70 are rejected under 35 U.S.C. 103(a) as being unpatentable over Stall et al (US 5,544,618) in view of Ahn (US 6,726,801) and Makino et al (US 5,391,260).

Stall et al discloses:

Regarding Claims 56, 62 and 69: an apparatus and a method of making an improved vacuum processing apparatus 10 (Fig 1) , comprising a processing chamber 100 (Fig 1), including a lower wall; an upper wall; a side wall coupled to the lower wall and the upper wall 104; and a plurality of pumping ports 178 (one pumping port disclosed in column 11, lines 14 – 21) and the other port not labeled (Figs 1, 2) formed in one of the lower cylindrical side wall 106 of the processing chamber; connecting a seal (flange) to the second pumping port (not labeled, 180 degrees across the exhaust port 178, Figs 1 and 2) such that the seal blocks the gas flow through the second pumping port;

Stall et al does not disclose: Regarding claim 56, connecting a pumping cell, including a vacuum pump and a valve, to a first pumping port 178;

Ahn discloses: a processing apparatus (Fig 1) comprising a pumping cell (vacuum pump 120 and a gate valve 124 and another valve 122 upstream of valve 122.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to provide a pumping cell (vacuum pump and a valve) in the apparatus of Stall et al as taught by Ahn. It would have been obvious to a skilled artisan to combine the elements of prior art to yield predictable results such as providing a pumping cell (vacuum pump and a valve) in the apparatus of Stall et al as taught by Ahn.

The motivation for providing a pumping cell (vacuum pump and a valve) in the apparatus of Stall et al is to pull vacuum in the apparatus of Stall et al as taught by Ahn.

Stall and Ahn do not disclose: Regarding claims 56 and 69, removing the pumping cell from the first pumping port and providing a substitute seal to the first pumping port such that the substitute seal blocks a gas flow through the first pumping port; and removing the seal from the second pumping port and providing a substitute pumping cell to the second pumping port.

However, it would have been obvious to a skilled artisan at the time the invention was made to remove the pumping cell from the first pumping port and provide a substitute seal (flange) of the second pumping port to the first pumping port such that the substitute seal blocks the gas flow through the first pumping port and provide the removed pumping cell of the first pumping port to the second pumping port in the apparatus of Stall and Ahn.

The motivation for removing the pumping cell from the first pumping port and provide a substitute seal (flange) of the second pumping port to the first pumping port such that the substitute seal blocks the gas flow through the first pumping port and provide the removed pumping cell of the first pumping port to the second pumping port in the apparatus of Stall and Ahn is to rearrange the pumping cell and the seal (flange) for optimizing the exhaust gas flow in the apparatus of Stall and Ahn. Further it has been held mere rearrangement of parts which does not modify the operation of a device is prima facie obvious. In re Japikse, 181 F.2d 1019, 86 USPQ 70 (CCPA 1950). In re Kuhle, 526 F.2d 553, 188 USPQ 7 (CCPA 1975).

Stall and Ahn further do not disclose: Regarding claim 56, that the gas flow is reconfigured by the providing the substitute seal to the first pumping port and the providing the substitute pumping cell to the second pumping port.

Makino et al discloses:

Regarding claim 56, in the first to third preferred embodiments (Column 5, lines 56 – 67), the exhaust pump 18 is provided (Fig 6) on one side-wall of the vacuum processing chamber. This location of the exhaust pump will cause a deviation of gas flow towards the vacuum pump upon evacuation of the chamber. To cope with this deviation, a pair of exhaust pumps (Fig 7) 42 may be provided on the opposite lower side walls of a vacuum processing chamber 41, so as to eliminate the deviation of gas flow upon evacuation (Column 6, lines 1- 6) of the chamber 41.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made that the gas flows towards the pumping cell of the second pumping port (reconfiguration of the gas flow towards the second vacuum port) when a seal (flange) is provided to the first pumping port blocking the gas flow in the apparatus of Stall et al and Ahn as taught by Makino et al.

The motivation for reconfiguring the gas flow when a seal (flange) is provided to the first pumping port and a pumping cell is provided to the second pumping port in the apparatus of Stall et al and Ahn is to provide a different exhaust gas flow direction to optimize the apparatus of Stall et al and Ahn.

Regarding claim 70, Stall et al does not disclose: removing the seal from the second pumping port includes removing the seal such that the seal does not contact the lower wall, the upper wall or the side wall.

However, it would have been obvious (by looking at Fig 1 of Stall et al) to one of ordinary skill in the art at the time the invention was made that removing the seal from the second pumping port, the seal will not contact the lower wall, the upper wall or the side wall in the apparatus of Stall et al.

Claims 57 – 59 are rejected under 35 U.S.C. 103(a) as being unpatentable over Stall et al (US 5,544,618) in view of Ahn (US 6,726,801) and Makino et al (US 5,391,260) as discussed in claims 56, 62, 69 and 70 above and further in view of Dandl et al (US 2001/0016166) and Os et al (US 6,178,918).

Stall et al, Ahn and Makino et al do not disclose:

Regarding claim 57, the side-wall has a height of at most about four inches.

Regarding claim 58 and 59, process chamber is made of a plate stock of aluminum having a thickness of about four inches.

Dandl et al discloses:

Regarding claim 57, the vertical height of the space between a substrate and a partition wall 4 is of the order of 10.2 cm (about 4 inches, Para 0124, Fig 1).

Os et al disclose:

Regarding claim 58 and 59, a cylindrical process chamber made of aluminum.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to make the vertical height of the side wall about four inches; make the process chamber from stock of aluminum in the apparatus of Stall et al, Ahn and Makino as taught by Dandl et al and Os et al respectively.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to make the process chamber from plate stock of aluminum of four inches thick in the apparatus of Stall et al, Ahn and Makino as taught by Dandl et al and Os et al.

The motivation to provide a side wall with a height of about four inches is to optimize the size of the process chamber in order to minimize fabrication and other costs in the apparatus of Stall et al, Ahn and Makino.

The motivation for making the process chamber from a single stock of aluminum plate is again to minimize fabrication costs in the apparatus of Stall et al, Ahn and Makino.

The motivation for making the process chamber from plate stock of aluminum of four inch thick in the apparatus of Stall et al, Ahn and Makino is to optimize the thickness of the processing chamber.

Claims 60 and 61 are rejected under 35 U.S.C. 103(a) as being unpatentable over Stall et al (US 5,544,618) in view of Ahn (US 6,726,801), Makino et al (US 5,391,260), Dandl et al (US 2001/0016166) and Os et al (US 6,178,918) as discussed in claims 57 - 59 above and further in view of Ishii (US 5,685,942).

Stall et al, Ahn, Makino et al, Dandl et al and Os et al do not disclose:

Regarding claim 60, the step of making the process chamber comprises a molding process.

Regarding claim 61, the lower wall is a plate and the side-wall is a rolled cylinder which is welded into the plate.

Ishii discloses:

Regarding claim 60, a plasma etching equipment 1 (Fig1) includes a processing housing 2 molded into a circular cylinder or a rectangular cylinder out of conducting material such as aluminum (Column 3, lines 30 – 35).

Regarding claim 61, it is well known in the art that two pieces can be joined together by welding.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use a molding process for fabricating a process chamber in the apparatus of Stall et al, Ahn, Makino et al, Dandl et al and Os et al as taught by Ishii. It would have been obvious to a skilled artisan to combine the elements of prior art to yield predictable results such as using a molding process for fabricating a process chamber in the apparatus of Stall et al, Ahn, Makino et al, Dandl et al and Os et al as taught by Ishii.

The motivation for using a molding process for fabricating a process chamber is to provide an alternate and equivalent means of fabricating process chambers as taught by Ishii.

Claims 63 – 66 and 68 are rejected under 35 U.S.C. 103(a) as being unpatentable over Stall et al (US 5,544,618) in view of Ahn (US 6,726,801), Makino

et al (US 5,391,260), Dandl et al (US 2001/0016166) and Os et al (US 6,178,918) as discussed in claims 57 - 59 above and further in view of Ohmi et al (US 6,357,385).

Stall et al, Ahn, Makino et al, Dandl et al, Os et al were discussed above.

Stall et al further discloses regarding claim 63, a susceptor 146 (Fig 3b) positioned inside the vacuum chamber.

Stall et al does not disclose: Regarding claim 63, process chamber comprising a chuck (lower electrode); and regarding claim 68, comprising an upper electrode for creating plasma in the processing chamber.

Ahn discloses regarding claim 63, a process chamber (Fig 1) comprising a chuck (lower electrode) 104 (Fig 1) and an upper electrode 106 for creating a plasma in the processing chamber.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to provide a chuck (lower electrode) and an upper electrode in the apparatus of Stall et al as taught by Ahn.

The motivation for providing a chuck (lower electrode) and an upper electrode in the apparatus of Stall et al is to generate plasma in the apparatus of Stall et al as taught by Ahn.

Stall et al, Ahn, Makino et al, Dandl et al, Os et al do not discuss:

Regarding claim 63: providing three pumping ports on the lower wall of the process chamber symmetrically spaced about the chuck assembly.

Regarding claim 64, connecting three pumping cells to the process chamber, wherein each one of the three pumping cells are connected to a respective one of the

three pumping ports and the three pumping ports being configured to receive said substitute seal in order to reconfigure the gas flow in the vacuum processing apparatus.

Regarding claim 65, providing two pumping ports on the lower wall of the process chamber symmetrically spaced about the chuck assembly on opposing sides thereof.

Regarding claim 66, connecting two pumping cells to the process chamber, wherein each one of the two pumping cells are connected to a respective one of the two pumping ports and the two pumping ports being configured to receive said substitute seal in order to reconfigure the gas flow in the vacuum processing apparatus.

Ohmi et al discloses:

Regarding claims 63 – 66, in Figs 44A, 45 and 46, various embodiments of a vacuum processing chamber are disclosed e.g., in Fig 44A, the vacuum container 4401 has a shape close to a square, and four vacuum pumps 4402 are provided in the comers of this vacuum container 4401; in Fig 45, three pumping ports (gas outlets, 4504) comprising three vacuum pumps and in Fig 45; and two pumping ports (gas outlets, 4604) comprising two vacuum pumps. Ohmi et al further discloses that in this way, if exhaust is carried out by a plurality of vacuum pumps aligned around the substrate substantially axisymmetrical to an axis perpendicular to the substrate surface and running through the center of the substrate, uniform gas flow can be realized in a rotational direction above the substrate, without causing hardly any lowering of gas conductance (Column 14, lines 55 – 67, Column 15, lines 1 – 10).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to provide three pumping ports on the lower wall of the process chamber symmetrically spaced about the susceptor and containing three valves and three pumping cells; provide two pumping ports on the lower wall of the process chamber symmetrically spaced about the susceptor and containing two valves and two pumping cells in the apparatus of Stall et al, Ahn, Makino et al, Dandl et al, Os et al as taught by Ohmi et al.

It would also have been obvious that exhaust is carried out by a plurality of vacuum pumps aligned around the substrate substantially axisymmetrical to an axis perpendicular to the substrate surface and running through the center of the substrate, uniform gas flow can be realized in a rotational direction above the substrate, without causing hardly any lowering of gas conductance in the apparatus of Stall et al, Ahn, Makino et al, Dandl et al, Os et al as taught by Ohmi et al.

The motivation for providing provide three pumping ports on the lower wall of the process chamber symmetrically spaced about the susceptor and containing three valves and three pumping cells; provide two pumping ports on the lower wall of the process chamber symmetrically spaced about the chuck assembly and containing two valves and two pumping cells in the apparatus of Stall et al, Ahn, Makino et al, Dandl et al, Os et al is to provide an alternate and equivalent arrangement of vacuum pumps in a processing apparatus as taught by Ohmi et al.

Claim 67 are rejected under 35 U.S.C. 103(a) as being unpatentable over Stall et al (US 5,544,618) in view of Ahn (US 6,726,801) and Makino et al (US 5,391,260)

as discussed in claims 56, 62, 69 and 70 above and further in view of Carducci et al (US 2003/0038111).

Stall et al, Ahn and Makino et al do not disclose: the process chamber is configured to have a chamber liner configured to reduce the open volume within the process chamber.

Carducci et al discloses:

Regarding claim 67, chamber liner 104 is disposed as a first liner 134, a second liner 118 and the lid liner 104 (Para 0056) adjacent to walls 106, 108 and the lid 102.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to install a liner in the apparatus of Stall et al, Ahn and Makino et al as taught by Carducci et al. It would have been obvious to a skilled artisan to combine the elements of prior art to yield predictable results such as installing a liner in the apparatus of Stall et al, Ahn and Makino et al as taught by Carducci et al.

The motivation to provide a liner in the process chamber is to prevent the plasma gases from attacking the process chamber walls in the apparatus of Stall et al, Ahn and Makino et al as taught by Carducci et al.

Claims 56, 62 and 68, 69 are rejected under 35 U.S.C. 103(a) as being unpatentable over Komino (US 6,634,845) in view of Stall et al (US 5,544,618) and Makino et al (US 5,391,260).

Komino discloses a processing chamber (Fig 1) comprising:

Regarding claims 56 and 62, a processing vessel (chamber) PC having a lower wall (not labeled) and a side wall (not labeled) having a plurality of pumping ports (not labeled) disposed along the periphery of the floor in the lower chamber separated from each other, symmetrically spaced about a chuck assembly 84, and each pumping port connected to a pump cell (pump 88 and valve 89; Fig 16, Column 14, lines 42 - 64). Komino further discloses the pressure adjust valves 89 are closed when not in operation (Column 15, lines 25 – 28).

Komino does not disclose: Regarding claim 56, connecting a seal (valve, flange) to a second pumping port (one of the many pumping ports) such that the seal blocks the gas flow through the second pumping port.

Stall et al discloses:

Regarding Claim 56: an apparatus and a method of making an improved vacuum processing apparatus 10 (Fig 1) , comprising a processing chamber 100 (Fig 1), including a lower wall; an upper wall; a side wall coupled to the lower wall and the upper wall 104; and a plurality of pumping ports 178 (one pumping port disclosed in column 11, lines 14 – 21) and the other port not labeled (Figs 1, 2) formed in one of the lower cylindrical side wall 106 of the processing chamber; connecting a seal (flange) to the second pumping port (not labeled, 180 degrees across the exhaust port 178, Figs 1 and 2) such that the seal blocks the gas flow through the second pumping port;

Komino and Stall do not disclose: Regarding claims 56 and 69, removing the pumping cell from the first pumping port and providing a substitute seal to the first pumping port such that the substitute seal blocks a gas flow through the first pumping

port; and removing the seal from the second pumping port and providing a substitute pumping cell to the second pumping port.

However, it would have been obvious to a skilled artisan at the time the invention was made to remove the pumping cell from the first pumping port and provide a substitute seal (flange) of the second pumping port to the first pumping port such that the substitute seal blocks the gas flow through the first pumping port and provide the removed pumping cell of the first pumping port to the second pumping port in the apparatus of Komino and Stall.

It would also have been obvious to a skilled artisan at the time the invention was made to remove the pumping cell from the first pumping port and provide a substitute seal (flange) of the second pumping port to the first pumping port such that the substitute seal blocks the gas flow through the first pumping port and install the removed pumping cell of the first pumping port to the second pumping port in the apparatus of Komino and Stall.

The motivation for removing the pumping cell from the first pumping port and provide a substitute seal (flange) of the second pumping port to the first pumping port such that the substitute seal blocks the gas flow through the first pumping port and provide the removed pumping cell of the first pumping port to the second pumping port in the apparatus of Komino and Stall et al, is the rearrangement of the pumping cell and the seal (flange) for optimizing the exhaust gas flow in the apparatus of Komino and Stall et al. Further it has been held mere rearrangement of parts which does not modify

the operation of a device is prima facie obvious. In re Japikse, 181 F.2d 1019, 86 USPQ 70 (CCPA 1950). In re Kuhle, 526 F.2d 553, 188 USPQ 7 (CCPA 1975).

Komino and Stall further do not disclose: Regarding claim 56, that the gas flow is reconfigured by the providing the substitute seal to the first pumping port and the providing the substitute pumping cell to the second pumping port.

Makino et al discloses:

Regarding claim 56, in the first to third preferred embodiments (Column 5, lines 56 – 67), the exhaust pump 18 is provided (Fig 6) on one side-wall of the vacuum processing chamber. This location of the exhaust pump will cause a deviation of gas flow towards the vacuum pump upon evacuation of the chamber. To cope with this deviation, a pair of exhaust pumps (Fig 7) 42 may be provided on the opposite lower side walls of a vacuum processing chamber 41, so as to eliminate the deviation of gas flow upon evacuation (Column 6, lines 1- 6) of the chamber 41).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made that the gas flows towards the pumping cell of the second pumping port (reconfiguration of the gas flow towards the second vacuum port) when a seal (flange) is provided to the first pumping port blocking the gas flow in the apparatus of Komino and Stall et al as taught by Makino et al.

The motivation for reconfiguring the gas flow when a seal (flange) is provided to the first pumping port and a pumping cell is provided to the second pumping port in the apparatus of Komino and Stall et al is to provide a different exhaust gas flow direction to optimize the apparatus of Komino and Stall et al.

Regarding claim 68, Makino discloses, an upper electrode 93a (Fig 17) to facilitate the formation of plasma.

Claims 57 – 59 are rejected under 35 U.S.C. 103(a) as being unpatentable over Komino (US 6,634,845) in view of Stall et al (US 5,544,618) and Makino et al (US 5,391,260) as discussed in claims 56, 62 and 68, 69 above and further in view of Dandl et al (US 2001/0016166) and Os et al (US 6,178,918).

Komino, Stall et al and Makino et al do not disclose:

Regarding claim 57, the side-wall has a height of at most about four inches.

Regarding claim 58 and 59, process chamber is made of a plate stock of aluminum having a thickness of about four inches.

Dandl et al discloses:

Regarding claim 57, the vertical height of the space between a substrate and a partition wall 4 is of the order of 10.2 cm (about 4 inches, Para 0124, Fig 1).

Os et al disclose:

Regarding claim 58 and 59, a cylindrical process chamber made of aluminum.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to make the vertical height of the side wall about four inches; make the process chamber from stock of aluminum in the apparatus of Komino, Stall et al and Makino et al as taught by Dandl et al and Os et al respectively.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to make the process chamber from plate stock of aluminum of four inches thick in the apparatus of Komino, Stall et al and Makino et al as taught by Dandl et al and Os et al.

The motivation to provide a side wall with a height of about four inches is to optimize the size of the process chamber in order to minimize fabrication and other costs in the apparatus of Komino, Stall et al and Makino et al.

The motivation for making the process chamber from a single stock of aluminum plate is again to minimize fabrication costs in the apparatus of Komino, Stall et al and Makino et al.

The motivation for making the process chamber from plate stock of aluminum of four inch thick in the apparatus of Komino, Stall et al and Makino et al is to optimize the thickness of the processing chamber.

Claims 60 and 61 are rejected under 35 U.S.C. 103(a) as being unpatentable over Komino (US 6,634,845) in view of Stall et al (US 5,544,618) and Makino et al (US 5,391,260), Dandl et al (US 2001/0016166) and Os et al (US 6,178,918) as discussed in claims 57 - 59 above and further in view of Ishii (US 5,685,942).

Komino, Stall et al Makino et al, Dandl et al and Os et al do not disclose:

Regarding claim 60, the step of making the process chamber comprises a molding process.

Regarding claim 61, the lower wall is a plate and the side-wall is a rolled cylinder which is welded into the plate.

Ishii discloses:

Regarding claim 60, a plasma etching equipment 1 (Fig1) includes a processing housing 2 molded into a circular cylinder or a rectangular cylinder out of conducting material such as aluminum (Column 3, lines 30 – 35).

Regarding claim 61, it is well known in the art that two pieces can be joined together by welding.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use a molding process for fabricating a process chamber in the apparatus of Komino, Stall et al, Makino et al, Dandl et al and Os et al as taught by Ishii. It would have been obvious to a skilled artisan to combine the elements of prior art to yield predictable results such as using a molding process for fabricating a process chamber in the apparatus of Komino, Stall et al, Makino et al, Dandl et al and Os et al as taught by Ishii.

The motivation for using a molding process for fabricating a process chamber is to provide an alternate and equivalent means of fabricating process chambers as taught by Ishii.

Claims 63 - 66 are rejected under 35 U.S.C. 103(a) as being unpatentable over Komino (US 6,634,845) in view of Stall et al (US 5,544,618) and Makino et al (US 5,391,260), Dandl et al (US 2001/0016166) and Os et al (US 6,178,918) as discussed in claims 57 - 59 above and further in view of Ohmi et al (US 6,357,385).

Komino, Stall et al, Makino et al, Dandl et al, Os et al were discussed above.

Komino further discloses a chuck 84 (Fig 17) positioned inside the vacuum chamber. A plurality of valves 89 are provided on the pumping ports (not labeled, Fig 17) connected to vacuum pumps 88.

Komino, Stall et al, Makino et al, Dandl et al and Os et al do not discuss:

Regarding claim 63: providing three pumping ports on the lower wall of the process chamber symmetrically spaced about the chuck assembly.

Regarding claim 64, connecting three pumping cells to the process chamber, wherein each one of the three pumping cells are connected to a respective one of the three pumping ports and the three pumping ports being configured to receive said substitute seal in order to reconfigure the gas flow in the vacuum processing apparatus.

Regarding claim 65, providing two pumping ports on the lower wall of the process chamber symmetrically spaced about the chuck assembly on opposing sides thereof.

Regarding claim 66, connecting two pumping cells to the process chamber, wherein each one of the two pumping cells are connected to a respective one of the two pumping ports and the two pumping ports being configured to receive said substitute seal in order to reconfigure the gas flow in the vacuum processing apparatus.

Ohmi et al discloses:

Regarding claims 63 – 66, in Figs 44A, 45 and 46, various embodiments of a vacuum processing chamber are disclosed e.g., in Fig 44A, the vacuum container 4401 has a shape close to a square, and four vacuum pumps 4402 are provided in the comers of this vacuum container 4401; in Fig 45, three pumping ports (gas outlets,

4504) comprising three vacuum pumps and in Fig 45; and two pumping ports (gas outlets, 4604) comprising two vacuum pumps. Ohmi et al further discloses that in this way, if exhaust is carried out by a plurality of vacuum pumps aligned around the substrate substantially axisymmetrical to an axis perpendicular to the substrate surface and running through the center of the substrate, uniform gas flow can be realized in a rotational direction above the substrate, without causing hardly any lowering of gas conductance (Column 14, lines 55 – 67, Column 15, lines 1 – 10).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to provide three pumping ports on the lower wall of the process chamber symmetrically spaced about the chuck assembly and containing three valves and three pumping cells; provide two pumping ports on the lower wall of the process chamber symmetrically spaced about the chuck assembly and containing two valves and two pumping cells in the apparatus of Komino, Stall et al, Makino et al, Dandl et al and Os et al as taught by Ohmi et al.

It would also have been obvious that exhaust is carried out by a plurality of vacuum pumps aligned around the substrate substantially axisymmetrical to an axis perpendicular to the substrate surface and running through the center of the substrate, uniform gas flow can be realized in a rotational direction above the substrate, without causing hardly any lowering of gas conductance in the apparatus of Komino, Stall et al, Makino et al, Dandl et al and Os et al as taught by Ohmi et al.

The motivation for providing provide three pumping ports on the lower wall of the process chamber symmetrically spaced about the chuck assembly and containing

three valves and three pumping cells; provide two pumping ports on the lower wall of the process chamber symmetrically spaced about the chuck assembly and containing two valves and two pumping cells in the apparatus of Komino, Stall et al, Makino et al, Dandl et al and Os et al is to provide an alternate and equivalent arrangement of vacuum pumps in a processing apparatus as taught by Ohmi et al.

Claim 67 are rejected under 35 U.S.C. 103(a) as being unpatentable over Komino (US 6,634,845) in view of Stall et al (US 5,544,618) and Makino et al (US 5,391,260) as discussed in claims 56, 62 and 68, 69 above and further in view of Carducci et al (US 2003/0038111).

Komino, Stall et al and Makino et al do not disclose: the process chamber is configured to have a chamber liner configured to reduce the open volume within the process chamber.

Carducci et al discloses:

Regarding claim 67, chamber liner 104 is disposed as a first liner 134, a second liner 118 and the lid liner 104 (Para 0056) adjacent to walls 106, 108 and the lid 102.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to install a liner in the apparatus of Komino, Stall et al and Makino et al as taught by Carducci et al respectively.

The motivation to provide a liner in the process chamber is to prevent the plasma gases from attacking the process chamber walls in the apparatus of Komino, Stall et al and Makino et al as taught by Carducci et al.

Claim 70 is rejected under 35 U.S.C. 103(a) as being unpatentable over Komino (US 6,634,845) in view of Stall et al (US 5,544,618) and Makino et al (US 5,391,260) as discussed in claims 56, 62. 68 and 69 above.

Komino, Stall et al and Makino et al were discussed above.

Komino, Stall et al and Makino et al do not disclose: removing the seal (valve) from the second pumping port includes removing the seal (valve) such that the seal (valve) does not contact the lower wall, the upper wall, or the side wall.

However, it would have been obvious (by looking at Fig 1 of Stall et al) to one of ordinary skill in the art at the time the invention was made that removing the seal from the second pumping port, the seal will not contact the lower wall, the upper wall or the side wall in the apparatus of Komino, Stall et al and Makino et al.

Response to Arguments

Claim 56 is also rejected under 112, first paragraph. Claim 56 contains new matter, for example, it recites the language 'a pumping cell, integrally including a vacuum pump and a valve' which is not supported by the Applicant's specification.

Further, the claims 63 – 66 are rejected using a new reference of Ohmi et al (US 6,357,385) which discloses the symmetrically spaced arrangement of three vacuum pumps and two vacuum pumps in Figs 45 and 46.

All the claims are also rejected using a new reference of Stall et al (US 5,544,618) in combination with other references.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to SATISH CHANDRA whose telephone number is (571)272-3769. The examiner can normally be reached on 8 a.m. - 4:30 p.m..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Parviz Hassanzadeh can be reached on 571-272-1435. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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/Jeffrie R. Lund/
Primary Examiner, Art Unit 1792

Satish Chandra

SC
9/27/2008